

PATENT APPLN. NO. 10/531,047  
SUBMISSION UNDER 37 C.F.R. § 1.114

**PATENT**

REMARKS

Claims 1 and 3 have been amended to recite that the nonaqueous electrolyte of the rechargeable lithium battery of the present invention contains carbon dioxide dissolved therein in addition to carbon dioxide formed during fabrication of the battery and forms a film having a lithium-ion conducting capability on a surface of said negative electrode. The phrase "and the increase in porosity of said silicon particles and/or silicon alloy particles during charge and discharge is suppressed" has been deleted from these claims.

Claim 26 has been amended to recite that a film having a lithium-ion conducting capability is formed on a surface of said negative electrode by the dissolving of the carbon dioxide in the said nonaqueous electrolyte. The phrase "the increase in porosity of said silicon particles and/or silicon alloy particles during charge and discharge is suppressed" has been deleted from the claim.

The amendments to claims 1, 3 and 26 are supported in the specification of the present application, for example, in paragraph [0012] on page 6, lines 3-4, and paragraph [0086] on page 36, lines 13-19.

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Referring to the Final Office Action, the claims of the application are rejected under 35 U.S.C. § 103(a) as being unpatentable over Fukui et al., WO 2002/21616 ("Fukui") in view of Hiroshi ISHIZUKA et al., JP 10-040958, machine translation (identified by the Office in the Action as "Hiroshi et al." and referred to herein as "Hiroshi").

The rejection of the claims under 35 U.S.C. § 103(a) over Fukui in view of Hiroshi is the same rejection that has been made in Office Action dated January 7, 2009, the Final Office Action dated July 6, 2009, and the Office Action dated December 23, 2009.

Applicants respectfully submit that a person of ordinary skill in the art would not have been motivated to modify the battery of Fukui using the teachings of Hiroshi as proposed by the Office.

As noted above, the claims have been amended to require the formation of a film having a lithium-ion conducting capability on a surface of the negative electrode of the rechargeable lithium battery of the present invention.

Hiroshi, on the other hand, discloses that carbon dioxide in a cell is conventionally known to be used to prevent the formation of a coating on the cathode (paragraph [0008]). This is admitted by the Office (page 8, lines 10 - 12, of the Final Office Action). Therefore, it would NOT have been obvious to one of ordinary skill

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in the art at the time of invention to, contrary to the teachings of Hiroshi, apply dissolved carbon dioxide gas within the electrolyte solution of the rechargeable lithium battery of Fukui in order to improve the characteristics of the negative electrode by forming a film having lithium-ion conducting capability on a surface of the negative electrode.

For this reason, the combination of Fukui and Hiroshi fails to support a case of prima facie obviousness under 35 U.S.C. § 103(a) of the claims of the application, particularly as amended herein. Removal of the 35 U.S.C. § 103(a) rejection is in order.

Moreover, as explained in the response filed March 23, 2010, to the Office Action dated December 23, 2010, the present invention provides unexpected results sufficient to rebut a case of prima facie obviousness. Specifically, as demonstrated by the comparative data in the present application (see, for example, Experiments 1 and 2 and the data of Table 2 on page 33 of the specification), the present invention suppresses an increase in porosity of the negative electrode active material particles during charge and discharge (paragraph [0007] of the present specification). This accordingly suppresses a thickness increase of the electrode and thereby increases a volumetric energy density of the electrode and, additionally, increases the cycle life of the

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battery. Neither Fukui nor Hiroshi discloses or suggests that an increase in porosity of negative electrode active material particles comprised of silicon particles and/or silicon alloy particles can be suppressed during charge and discharge by the addition of dissolved carbon dioxide to the electrolyte solution of a rechargeable lithium battery.

In the Final Office Action the Office has taken the position that the suppression of an increase in porosity of the negative electrode material particles during charge and discharge is the recognition of another advantage which would flow naturally from following the suggestion of the prior art. (See paragraph (b) on page 8 of the Final Office Action).

The Examiner's position is improper and not supported by the case law. The Federal Circuit has held that evidence of unexpected results must be considered in determining obviousness. See *Ruiz v. AB Chance Co.*, 234 F.3d 654, 667 [57 USPQ2d 1161] (Fed. Cir. 2000) ("Our precedents clearly hold that secondary considerations, when present, must be considered in determining obviousness."); *In re Soni*, 54 F.3d 746, 750 [34 USPQ2d 1684] (Fed. Cir. 1995) (stating that "all evidence of nonobviousness must be considered when assessing patentability").

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Therefore, the Office must consider the evidence of unexpected results shown by the comparative data in the present application. Such data rebuts the Office's case of prima facie obviousness and places the application in condition for allowance.

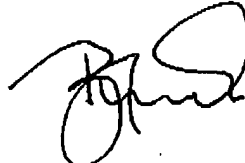
The foregoing is believed to be a complete and proper response to the Office Action dated June 30, 2010.

In the event that this paper is not considered to be timely filed, applicants hereby petition for an appropriate extension of time. The fee for any such extension may be charged to our Deposit Account No. 111833.

In the event any additional fees are required, please also charge our Deposit Account No. 111833.

Respectfully submitted,

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